# Microwave Sample Preparation Performance System Specifications

## Power & Electrical Specifications

1. Microwave heating system must be a 208/230Volt, 15 amp system and have a measured minimum power output of 1600 watts.

2. System must be capable of delivering continuous power at 400, 800 and 1600 watts for precise heating control.

3. System must conform to UL Standard 3101-1 which certifies electrical equipment for laboratory use. Vendor must submit test report as verification.

4. System must have a device to protect the magnetron from back reflected energy. To ensure even heating it must be located external to the cavity. Microwave absorbing devices in the cavity itself and are not acceptable.

5. System software must automatically adjust the power delivery based upon sample load and pre-programmed control settings.

## Hardware & Operating System Specifications

1. System must have a built in operating system with high resolution fluorescent display and alphanumeric keypad

2. System must operate stand alone and must **not** require the use of any external computer for operation.

3. For safety the unit must measure the pressure inside the control vessel up to 2000psig.

4. System must be equipped with a temperature device that will accurately measure and control the temperature inside the control vessel up to 300°C.

5. All temperature control devices must be non metallic and NIST traceable with certificate provided for accuracy.

6. System must have the capability to control the temperature of all vessels within the batch. This must incorporate
the simultaneous integration of an internal fiber optic and a contactless temperature device. Thus allowing the energy input by the magnetron to be controlled by all vessels within the batch.

7. For **safety** reasons the system must include a monitoring system that disables the magnetron power when it detects a vessel vent or failure, *even* if it does not occur in the control vessel.

8. System must have the capability to continuously stir the samples during the digestion/reaction process as an option.

## Vessel Specifications

**1.** System must be capable of processing a minimum **14 high pressure** (500 psig) vessels simultaneously or **12 Very High Pressure (1500 psi)** simultaneously.

2. Vessels must be able to be individually loaded and removed from the microwave for ease of handling.

3. Microwave digestion vessels must be **ventable** prior to uncapping the vessel in order to meet current and pending **EPA** procedures as well as for safety reasons.

4. For ease of use the vessels must not require the use of an energizing tool in order to reform seals prior to operation.

5. System must be capable of processing a minimum of **40 Moderate Pressure** (500 psi) vessels simultaneously in a single turntable. Each vessel must be individually temperature controlled using an NIST calibrated temperature measurement device with the current temperature continuously displayed for confirmation of digestion conditions.

   High throughput vessel set must be available in 10mL, 25mL, 55mL, and 75mL sizes in order to accommodate the dynamic needs of the laboratory. Also, 55mL option must be available in PFA and TFM material, allowing flexibility in sample preparation and vessel longevity.

   Temperature measurement of the 40 position turntable must be **volume independent**, such as dual IR devices mounted in the cavity floor, and as opposed to a side-wall mounted IR device that will not provide an accurate temperature reading if sample volume is below the IR device.

6. System must be capable of processing a minimum of **24 High Performance** (200psi) glass vessels, 20mL and 40mL available, simultaneously in a single turntable.

7. System must be able to accommodate, up to, a 5L round bottom flask for open vessel applications, along with an inlet/outlet port capable of handling a 29/42 glass joint for reflux applications.

## General Specifications

1. The Vendor must have submitted **NPDES** data to the **US EPA** and received approval for their microwave procedure in the Federal Register. A copy of the appropriate pages from the **Federal Register** citing the vendor's data submission and approval must be provided.

2. System must carry a minimum one year warranty on parts and labor.

3. The Vendor must document that they maintain a nationwide direct Field Service Department trained to repair this system in order to minimize downtime by providing prompt on-site repair as an option to sending equipment back to the factory.

4. Vendor may be required at the request of the end user to demonstrate capabilities of the system prior to awarding of the bid to insure it meets our requirements.

5. Vendor must be able to provide ISO-9001:2000 Certification documentation for quality assurance purposes.

**4.**
**5.**